REGIRER, S.A. (Vorkuta)

Some thermodynamical problems in a steady one-dimensional flow of a viscous drop-shaped liquid. Prikl.mat. i mekh. 21 no.3:424-430 My-Je '57. (MIRA 10:10)

(Hydrodynamics) (Heat--Transmission)

REGIRER, S.A.

Category : USSR/Atomic and Molecular Physics - Liquids D-8

Abs Jour : Ref Zhur - Fizika, No 3, 1957, No 6444

Author : Zorazdovskiy, T.Ya., Regirer, S.A.

Title : Motion of a Newtonian Liquid Between Rotating Coaxial Cylinders in the Presence of Internal Thermal Processes that Affect the Viscous Properties.

Orig Pub : Zh. tekhn. fiziki, 1956, 26, No 7, 1532-1541

Abstract : It is indicated that the assumption that the coefficient of viscosity η is constant, used in the theory of rotary viscosimeters, cannot be used at large values of η and of angular speeds ω, for as a result of the considerable amount of heat liberated, the temperature T is not constant in the liquid layer. The equations of hydrodynamics and of thermal conductivity are solved simultaneously for the case of two coaxial infinite cylinders under the assumption that the dependence of η on T is hyperbolic:

$$\eta_T = \eta_m / [1 + \alpha^2 (T - T_m)].$$

In the practical use of the calculated data the unknowns are η_m and α, which is the temperature coefficient of η.

Card : 1/2

REGIRER, S.A.

Motion of Newtonian Liquid Between Rotating Coaxial Cylinders in the Presence of Thermal Processes Affecting the Viscous Properties. T. Ia. Gorazdovskii and S. A. Regirer. *Sov. Phys. - Tech. Phys.*, no. 7, 1957, pp. 1,493-1,503. 18 refs. Translation.

2

Regirer, S. A.

20-3-8/52

AUTHOR: Regirer, S. A.

TITLE: On the Uniqueness of the Solution of Approximate Boundary Problems of the Dynamics of an Incompressible Liquid of Variable Viscosity (O yedinstvennosti resheniya priblizhennykh granichnykh zadach dinamiki neszhimayemoy zhidkosti s peremennoy vyazkost'yu)

PERIODICAL: Doklady AN SSSR, 1957, Vol. 117, Nr 3, pp. 384 - 386 (USSR)

ABSTRACT: The equations of the dynamics of an incompressible liquid with variable viscosity have the form:

$$\frac{\partial \vec{v}}{\partial t} + (\vec{v}\nabla)\vec{v} = -(1/\varrho)\nabla p + \vec{F} + \nu\Delta\vec{v} + 2(\vec{\alpha}\nabla)\vec{v} + \vec{\alpha} \times \vec{\Omega};$$

$\operatorname{div}\vec{v} = 0$, $\frac{\partial T}{\partial t} + \vec{v}\nabla T = \alpha\Delta T + \frac{\nu}{Ic} E$. Here it holds that $E = [\Omega^2 + 2\operatorname{div}(\vec{v}\nabla)\vec{v}]$ $\vec{\alpha} = \nabla\nu$, $\Omega = \operatorname{rot}\vec{v}$. The rest of the denotations are the usual ones. In the equations given initially let the function ν (x, y, z, t) be assumed to be uniquely given, constant and limited. For the required function $\vec{v}$(x, y, z, t) the conditions are then given. The conditions mentioned initially on these conditions permit a unique solution for $\vec{v}$, which is regular in a certain domain and which has constant first derivatives. The

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On the Uniqueness of the Solution of Approximate Boundary Problems of the Dynamics of an Incompressible Liquid of Variable Viscosity

proof of uniqueness is here carried out step by step. The author then investigates the problem of second approximation, which consists of the determination of $T(x, y, z, t)$ from the corresponding aforementioned equation in the case of given initial and boundary conditions. The author here proves that, in the case of certain restrictions, which are mentioned here, the third of the above equations has a regular solution, which is unique within a certain domain. Also in this case proof is carried out step by step. In conclusion the generalization of these proofs is pointed out. There are 3 references, 2 of which are Slavic.

ASSOCIATION: **Vorkuta Scientific Research Station for Permafrost of the Permafrost Institute im. V. A. Obruchev, AN USSR (Vorkutskaya nauchno-issledovatel'skaya merzlotnaya stantsia Instituta merzlotovedeniya im. V. A. Obrucheva Akademii Nauk SSSR)**

PRESENTED: May 31, 1957, by S. L. Sobolev, Academician
SUBMITTED: May 22, 1957
AVAILABLE: Library of Congress

Card 2/2

REGIRER, S. A.

[illegible] Regirer, S. A. [illegible] May-June [illegible]
450. 13 refs. In Russian. Study of the plane one-dimensional flow of a viscous liquid with heat transfer, taking into account the effect of temperature and dissipation energy on viscosity.

3
4E4

REGIRER, S.A.

Uniqueness of the solution of approximate boundary problems in the dynamics of an incompressible fluid of variable viscosity. Dokl. AN SSSR 117 no.3:384-386 N '57. (MIRA 11:3)

1. Vorkutskaya nauchno-issledovatel'skaya merzlotnaya stantsiya Instituta merzlotovedeniya im. V.A. Obrucheva AN SSSR. Predstavleno akademikom S.L. Sobolevym.

(Fluid dynamics)

AUTHOR: Regirer, S.A. (Vorkuta) SOV/40-22-3-20/21

TITLE: The Influence of the Thermal Effect on the Viscosity Resistance for the Stationary Unidimensional Flow in Narrow Channels (Vliyaniye teplovogo effekta na vyazkoye soprotivleniye v ustanovivshemsya odnomernom techenii kapel'noy zhidkosti)

PERIODICAL: Prikladnaya matematika i mekhanika, 1958, Vol 22, Nr 3, pp 414 - 418 (USSR)

ABSTRACT: The author investigates the connection between the shearing stress of a viscous liquid and the velocity gradient for a stationary axialsymmetric flow between two infinite cylindrical surfaces. Here the cylinder surfaces have parallel generatrices; one cylinder is to rest, while the other one moves with a constant velocity. As already shown by other authors all axial flows in the aperture between two cylinders can be reduced to this scheme of flow. For the calculations the loss of heat by emigration of energy is considered and an arbitrary law of dependence of the viscosity on the temperature is assumed. Forces due to inertia are neglected, furthermore the drop in pressure in the direction of the flow is assumed to be small.

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The Influence of the Thermal Effect on the Viscosity Resistance for the Stationary Unidimensional Flow in Narrow Channels SOV/40-22-3-20/21

In this case the problem can be calculated from the equations:

$$(2.1)\quad \tau = \eta \frac{dv}{dy} \;;\quad \frac{d\tau}{dy} = 0 \;;\quad \frac{d^2T}{dy^2} + \frac{\tau^2}{Jk\eta} = 0 \;.$$

k is the thermal conductivity of the liquid, J is the mechanic equivalent of the thermal energy. After the introduction of nondimensional variables and nondimensional parameters the equations are transformed and then integrated. In this way the dependence between a nondimensional shearing stress parameter and a nondimensional velocity parameter is obtained. The limit cases of this dependence are discussed.
There are 7 references, 6 of which are Soviet, and 1 is English.

SUBMITTED: December 24, 1956

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REGIRER, S.A. (Vorkuta)

Heat effect on the viscous resistance in a steady one-dimensional flow of a drop-forming liquid. Prikl. mat. i mekh. 22 no.3:414-418 My-Je '58. (MIRA 11:10)

(Thermodynamics)

SOV/179-59-2-36/40

AUTHOR: Regirer, S. A. (Vorkuta)

TITLE: On the Determination of the Relationship of Viscosity to Temperature in the Hydrodynamic Theory of Lubricants (Ob uchete zavisimosti vyazkosti ot temperatury v gidrodinamicheskoy teorii smazki)

PERIODICAL: Izvestiya Akademii nauk SSSR OTN, Mekhanika i mashinostroyeniye, 1959, Nr 2, pp 198-199 (USSR)

ABSTRACT: Two methods of calculation can be distinguished in the theory of the non-isothermal layer of a lubricant: first, when the variations of viscosity in the area of friction are considered and, second, where the distribution of temperature and viscosity along the thickness of the lubricant layer is taken into account. An attempt to coordinate the two methods is made by the author. The assumptions are made that, 1) the motion of a liquid proceeds in the thin layer δ between the parallel surfaces, i.e. $\delta/l = \varepsilon \ll 1$ (l - length of the curvature); 2) the velocity of motion is small,

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SOV/179-59-2-36/40

On the Determination of the Relationship of Viscosity to Temperature in the Hydrodynamic Theory of Lubricants

i.e. $V/U = \varepsilon \ll 1$; 3) the forces due to masses are disregarded; 4) the Reynold's number is of the magnitude $R \sim \varepsilon^{-1}$ ($R = Ul\rho/\eta$ where ρ - density, η - characteristic viscosity). The basic equations are shown as Eq (1) or as Eq (8) when the conditions Eq (2) and Eq (6) are substituted. The Reynold's equation (9) can be derived from Eq (8) when $\partial\eta/\partial y = 0$ and $\eta = \eta(x, z)$. Also, if H is expressed in the form $h^3/12\eta^*$ (η^* - mean viscosity) then the left term of Eq (8) can be written as Eq (10), where the value of η^* can be determined from Eq (11) (η_A - mean harmonic viscosity) (Refs 4 and 5). There are 6 Soviet references.

SUBMITTED: December 16, 1958.

Card 2/2

REGIRER, S.A. (Vorkuta)

Taking into consideration the relationship between the viscosity and the temperature in the hydrodynamic theory of lubrication. Izv.AN SSSR.Otd.tekh.nauk.Mekh. i mashinostr. no.2:198-199 Mr-Ap '59. (MIRA 12:5)
(Lubrication and lubricants)

REGIRER, S.A.

Unsteady flow of a conducting liquid in the presence of a magnetic field. Inzh.-fiz.zhur. no.8:43-50 Ag '59. (MIRA 12:11)

1. Severnoye otdeleniye Instituta merzlotovedeniya, Vorkuta.
(Magnetohydrodynamics)

REGIRER, S.A. (Vorkuta)

Unsteady asymptotic boundary layer on an infinite porous plate. Izv.AN SSSR.Otd.tekh.nauk. Mekh. i mashinostr. no.4:136-139 Jl-Ag '59. (MIRA 12:8)

(Fluid dynamics)

10(2); 24(3)

05294
SOV/170-59-8-5/18

AUTHOR: Regirer, S.A.

TITLE: The Non-Stabilized Flow of an Electroconductive Liquid in the Presence of a Magnetic Field

PERIODICAL: Inzhenerno-fizicheskiy zhurnal, 1959, Nr 8, pp 43 - 50 (USSR)

ABSTRACT: The plane problem on the flow of an incompressible electroconductive liquid between parallel solid walls in a magnetic field was solved by Hartmann /Ref 1/ for the case of a steady motion. The present paper generalizes this solution for the case of a non-stabilized motion. Two problems are discussed: 1. In the initial instant the liquid in the tube is at rest, and the longitudinal component of a magnetic field is zero; the pressure drop remains constant all the time. At $t > 0$, on the tube walls are fulfilled the conditions of adhesion and continuity of magnetic field. 2. In the initial instant the temperature of the liquid in the tube is zero; at $t > 0$, some additional conditions on temperature behavior are fulfilled on the tube walls. The first magnetohydrodynamic problem is solved by the operational calculus using Laplace transformations in the form of two series, Formulae 2.14 and 2.15. The second problem on the temperature distribution in a non-stabilized flow

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05294
SOV/170-59-8-5/18

The Non-Stabilized Flow of an Electroconductive Liquid in the Presence of a Magnetic Field

is simplified by substitution of dissipative terms with their values at a steady flow on the basis of Targ's approximation [Ref 6] and also solved by the operational method.
There are: 8 references, 7 of which are Soviet and 1 Danish.

ASSOCIATION: Severnoye otdeleniye Instituta merzlotovedeniya (Northern Branch of the Institute for Eternal Frost Study), Vorkuta

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SOV/20-127-5-13/58

10(4), 24(3)

AUTHOR: Regirer, S. A.

TITLE: The Non-steady Problem of Magnetic Hydrodynamics for the Semispace

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 127, Nr 5, pp 983-986 (USSR)

ABSTRACT: The non-steady onedimensional flow of a viscous fluid in the semispace is thoroughly investigated within classical hydrodynamics. The present paper deals with the analogous problem for a viscous electrically conductive fluid in a magnetic field. The following system of equations is written down
$\frac{\partial v}{\partial t} = \nu \frac{\partial v^2}{\partial y^2} + KH_0 \frac{\partial H}{\partial y}$; $\frac{\partial H}{\partial t} = \beta \frac{\partial^2 H}{\partial y^2} + H_0 \frac{\partial v}{\partial y}$ (1), where $K = \mu/4\pi\varrho$, $\beta = c^2/4\mu\pi\sigma$, the other notations are generally in use. For the boundary conditions the following is generally set up: $v(0,y) = f_1(y)$, $H(0,y) = f_2(y)$, $v(t,0) = \varphi_1(t)$, $H(t,0) = \varphi_2(t)$, $v(t,\infty) = 0$ (2). Further, the paper by D. Ye. Dolidze (Ref 1) is used for the purpose of proving the correctness of the following theorems: Theorem 1: The sytem (1), with boundary con-

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SOV/20-127-5-13/58

The Non-steady Problem of Magnetic Hydrodynamics for the Semispace

ditions being equal (2), has only a trivial solution in the class of the functions $L_2(0,\infty)$. Theorem 2 : the system (1) has not more than one solution in the case of the boundary condition (2). Theorem 3: the solution of the system (1) (2) is representable by means of the formulas (3). The functions v_η and H_η mentioned in (3) may be determined by means of the integral functions (5). Theorem 4: The system of integral equations (5) has a solution that may be found by successive approximation. There are 4 Soviet references.

ASSOCIATION: Severnoye otdeleniye Instituta merzlotovedeniya im. V. A. Obrucheva Akademii nauk SSSR (Northern Section of the Institute of Permafrost Science imeni V. A. Obruchev of the Academy of Sciences, USSR)

PRESENTED: April 25, 1959 by L. I. Sedov, Academician

SUBMITTED: April 2, 1959

Card 2/2

10(4)

SOV/179-59-4-19/40

AUTHOR: Regirer, S. A. (Vorkuta) (Komi Autonomous SSR, RSFSR)

TITLE: Unsteady Asymptotic Boundary Layer on an Infinite Porous Plate

PERIODICAL: Izvestiya Akademii nauk SSSR. Otdeleniye tekhnicheskikh nauk. Mekhanika i mashinostroyeniye, 1959, Nr 4, pp 136-139 (USSR)

ABSTRACT: The asymptotic boundary layer in steady flowing round a porous plate was investigated in the papers (Refs 1,2) for the case of homogeneous suction. Some accurate solutions for an unsteady flow of the same kind are dealt with here. The formulas (1.1), (1.2) and (1.3) are written down. Under the condition (1.3), the system (1.1), (1.2) expresses the unsteady flow in the asymptotic boundary layer on an infinite porous plate with homogeneous suction. The solutions of this system are accurate solutions of the Navier-Stokes equations, and are obtained on the basis of the so-called "principle of independence" (Ref 3). (1.3) shows that the coordinate system is connected with the external flow, whereas in the theory of the boundary layer it is connected with the body encircled. The equations (1.1), (1.2) under the conditions of (1.3) were studied by D. Ye. Dolidze (Ref 4). He reduced the problem of

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SOV/179-59-4-19/40

Unsteady Asymptotic Boundary Layer on an Infinite Porous Plate

Volterra's equation. Simpler methods can often be used for solving the problem. The introduction of a new independent variable into equation (1.1) leads to the ordinary problem of thermal conductivity, formula (4). A similar problem was quite thoroughly investigated in the paper (Ref 5). One of the known solutions of this problem is used here. The case with a constant penetration rate $v(t) = v_0$ is studied at first. In this case, the coefficients of equation (1.1) do not depend on time, and the Laplacian transformation can be applied. It is shown that, independent of $u_0(t)$, the displacement width, the loss of momentum and the loss of energy in the boundary layer, are reduced, in the case of exhaustion at all $t > 0$, as compared with an ordinary flow.- The case with an instantaneous change in the plate velocity (u_0 = constant), the solution of which is known from paper (Ref 6), is next investigated. This solution is obtained here from formula (2.4). It is shown that also in the case of an unsteady flow, the effect of the resistance reduction is achieved by exhaustion of the boundary layer. The displacement width is determined from formula (3.5) in this case. A simple problem of a boundary layer on a porous plate, which performs a harmonic oscillation motion in its

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Unsteady Asymptotic Boundary Layer on an Infinite Porous Plate

plane, is finally investigated. The solution of this problem consists in the solution of formula (1.1) under the conditions (4.1). This formula is transformed into the system (4.2), and its solution is given in the form of (4.4). At v_0, the known formula (4.5) is obtained (Ref 8). It is shown that these solutions correspond to the behavior of the liquid in the boundary layer in the case of suction at an infinite distance from the front edge of the plate. There are 3 figures and 8 references, 5 of which are Soviet.

SUBMITTED: January 17, 1959

21 (7), 10 (4)
AUTHOR: Regirer, S. A. SOV/56-37-1-33/64

TITLE: On the Convective Motion of a Conducting Liquid Between Parallel Vertical Plates in a Magnetic Field (O konvektivnom dvizhenii provodyashchey zhidkosti mezhdu parallel'nymi vertikal'nymi plastinami v magnitnom pole)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 37, Nr 1(7), pp 212 - 216 (USSR)

ABSTRACT: The free convective motion of a conducting liquid between vertical plates, on which constant temperature is maintained, in the presence of an external magnetic field, was closely investigated by G. Z. Gershuni and Ye. M. Zhukhovitskiy (Refs 1,2). In the present paper, the results concerning a steady flow are generalized for the case of the temperature variable in vertical direction. The author also investigates the superposition of free and forced convection, and in this way generalizes the known solution by J. Hartmann (Ref 3). A steady convective motion of the liquid is assumed to take place between the vertical infinite plates $x = \pm\delta$ (the temperature of which is $T_-(z)$ and $T_+(z)$. The streamlines are assumed to be parallel to the plates, i.e. to

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On the Convective Motion of a Conducting Liquid Between Parallel Vertical Plates in a Magnetic Field SOV/56-37-1-33/64

the z-axis. A transverse homogeneous magnetic field $H_x = H_o$ is assumed to be applied to the plates from without. At first, the general equations of magnetohydrodynamics are written down:

$$\frac{\partial\vec{v}}{\partial t} + (\vec{v}\nabla)\vec{v} = -\frac{1}{\varrho}\nabla\left(p + \frac{\mu H^2}{\varrho\pi}\right) + \nu\Delta\vec{v} + \frac{\mu}{4\pi\varrho}(\vec{H}\nabla)\vec{H} + \beta\vec{g}T\ \frac{\partial\vec{H}}{\partial t} + (\vec{v}\nabla)\vec{H} = (\vec{H}\nabla)\vec{v} + \frac{c^2}{4\pi\sigma\mu}\Delta\vec{H},\ \frac{\partial T}{\partial t} + \vec{v}\nabla T = a\Delta T,\ \mathrm{div}\,\vec{v} = 0,\ \mathrm{div}\,\vec{H} = 0.$$

T denotes the temperature, p the pressure, $\vec{v}$ and $\vec{H}$ the velocity vector and the field vector, respectively; ϱ, ν, μ, σ, a, β the density, the kinematic viscosity, the magnetic permeability, the conductivity, and the thermal expansion coefficient of the liquid. The problem to be investigated has an accurate solution of the form $v_x = v_y = 0$, $v_z = v(x)$, $H_x = H_x(x)$, $H_y = 0$, $H_z = H_z(x)$, $T = T(x,z)$, $p = p(x,z)$. The author then transforms the equations and boundary conditions by the introduction of new variables. The solution of the equation system thus transformed is then discussed. 7 equations are obtained for the determination of the

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On the Convective Motion of a Conducting Liquid Between Parallel Vertical Plates in a Magnetic Field SOV/56-37-1-33/64

constant. For the case of free steady convection, formulas are written down for the velocity and the induced component of the field, and for the temperature. The extremes of the velocity profile satisfy the equation $n\xi \operatorname{th} n\xi = n \operatorname{cth} n-1$, the solution of which tends to $\xi = \pm 1$ at $n \to \infty$. This proves the formation of a boundary layer at comparable values of M^4 and GP. P denotes the ordinary Prandtl number, M the Hartmann number, and G the Grashof number. At equal temperatures of the plates, a convective motion is only possible by the fulfillment of a certain dependence between M and G. At $G>0$, the equilibrium of the resting liquid is always stable, but at $G<0$, the equilibrium is only stable at $|n^2|<\pi^2$, i.e. at $|GP|<\pi^2(M^2 + \pi^2)$. At $GP = -\pi^2(M^2 + \pi^2)$, a steady laminar flow is possible. The presence of a magnetic field retards considerably the beginning of instability of the equilibrium. Finally, the case with a mixed flow is investigated. There are 5 references, 4 of which are Soviet.

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On the Convective Motion of a Conducting Liquid Between Parallel Vertical Plates in a Magnetic Field SOV/56-37-1-33/64

ASSOCIATION: Severnoye otdeleniye instituta merzlotovedeniya Akademii nauk SSSR (Northern Department of the Permafrost Institute of the Academy of Sciences, USSR)

SUBMITTED: February 7, 1959

Card 4/4

REGIRER, S. A. (Vorkuta)

"Some exact solutions of the magnetohydrodynamic equations for plane viscous flows."

report presented at the First All-Union Congress on Theoretical and Applied Mechanics, Moscow, 27 Jan - 3 Feb 1960.

[illegible], [illegible]

Methods for determining the abundance of gas in coal fields. Trudy SOEI no.1:51-55 '60. (MIRA 14:11)
(Mine gases)

APPROVED FOR RELEASE: Tuesday, August 01, 2000 CIA-RDP86-00513R0014445

REGIRER, S.A. (Vorkuta)

Flow of a conducting fluid in tubes of arbitrary shape in the presence of magnetic fields. Prikl.mat.i mekh. 24 no.3:541-542 My-Je '60. (MIRA 13:10)

(Magnetohydrodynamics)

REGIRER, S.A. (Vorkuta)

A precise solution of equations in magnetohydrodynamics. Prikl. mat. i mekh. 24 no. 2:383-386 Mr-Ap '60. (MIRA 14:5)
(Magnetohydrodynamics)

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80262
S/040/60/024/02/30/032

AUTHOR: Regirer, S. A. (Vorkuta) 21

TITLE: On a Rigid Solution of the Equations of Magnetic Hydrodynamics

PERIODICAL: Prikladnaya matematika i mekhanika, 1960, Vol. 24, No. 2, pp. 383-386

TEXT: The author investigates the flow of a viscous conducting liquid between parallel walls. Generalizing the set up of Hartmann (Ref. 1) the author seeks solutions of the form

$v_x = v(y)$, $v_y = v_z = 0$, $H_x = H_x(x,y)$, $H_y = H_y(x,y)$ $H_z = 0$, $p^* = p^*(x,y)$,

where $p^* = p + \mu H^2/8\pi$

Let the potential A be defined by $H_x = \frac{\partial A}{\partial y}$, $H_y = -\frac{\partial A}{\partial x}$. It is stated that

(1.10) $A = -xH_o(y) + \vartheta(y)$,

where H_o and ϑ are to be determined from a system of equations. Here it is obtained $H_o = hy + h_o$, h and h_o are constants, while

(2.4) $\vartheta' = C_H - \frac{Ey}{\lambda} - \frac{1}{\lambda}\int v H_o\, dy$

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S/040/60/024/02/30/032

On a Rigid Solution of the Equations of Magnetic Hydrodynamics

here λ is $\lambda = e^2/4\pi\sigma_c m$, while E is proportional to the z-component of the vector of the electric field.

The author considers some special cases.

There are 6 references: 1 Soviet, 2 English, 1 German, 1 Danish and 1 Norwegian.

SUBMITTED: August 18, 1959

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82124

S/040/60/024/03/13/020
C 111/ C 333

/C.2000 (A)

AUTHOR: Regirer, S. A.

TITLE: On the Flow of an Electricity Conducting Fluid in Tubes of Arbitrary Cross Section in Presence of a Magnetic Field

PERIODICAL: Prikladnaya matematika i mekhanika, 1960, Vol. 24, No. 3, pp. 541-542

TEXT: The author considers the stationary flow in an infinite tube, the cross section of which is an arbitrary simply connected domain B with a piecewise smooth boundary Σ , and which is in an external magnetic field independent of the coordinate of the tube axis. The author shows that the considered problem can be reduced to the successive solution of two linear boundary value problems. The first part of the solution consists in determining H_x, H_y from two Poisson equations under consideration of the continuity at the boundary Σ and of the prescribed values at infinity. The second part consists in determining v, H_z and $\partial p/\partial z$ from a linear system under consideration of the conditions

$$(12) \quad v/_{\Sigma} = 0, \qquad \int_B v dB = Q, \quad H_z/_{\Sigma} = f(P),$$

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S/040/60/024/03/13/020
C 111/ C 333

On the Flow of an Electricity Conducting Fluid in Tubes of Arbitrary Cross Section in Presence of a Magnetic Field

where Q and f(P) are prescribed. As a special case the results of Shercliff (Ref.4) are obtained.

There are 4 references: 1 Soviet, 1 English, 1 American and 1 Danish.

SUBMITTED: September 14, 1959

Card 2/2

REGIRER, S. A.

Approximate theory of the flow of a viscous noncompressible liquid in pipes with permeable walls. Zhur. tekhn. fiz. 30 no.6:639-643 Je '60. (MIRA 13:8)
(Fluid dynamics)

S/207/62/000/002/003/015
D237/D302

AUTHOR: Regirer, S. A. (Moscow)

TITLE: Stationary convective motion of a viscous, electro-conducting fluid in a circular, vertical pipe

PERIODICAL: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no. 2, 1961, 14-19

TEXT: Stationary convection and stability of a viscous conductive fluid filling a circular, vertical pipe in the presence of Joule dissipation and of an azimuthal magnetic field, is considered. Utilizing the results and formulation of his previous work (Ref. 1: PMTF, 1962, no. 1), the author obtains the general solution of the title problem expressed in terms of cylindrical functions, and consisting of symmetric and asymmetric terms. By considering transcendental Eqs.

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S/207/62/000/002/003/015
D237/D302

Stationary convective motion ...

$$F_0(z) = J_0(z^{1/4})I_1(z^{1/4}) - J_1(z^{1/4})I_0(z^{1/4}) = 0 \qquad (2.1)$$

$$F_1(z) - f_1(z) = z^{1/4}\left[\frac{J_0(z^{1/4})}{J_1(^{1/4})} + \frac{I_0(z^{1/4})}{I_1(z^{1/4})}\right] - 2\ 1 + \frac{M^2 - X^z}{M^2 + z} = 0 \qquad (2.2)$$

the author reaches some conclusions concerning the stability of the investigated convective flows and distinguishes between the loss of stability of 1st and 2nd kind, the difference depending on the behavior of the flow, when the critical value of Rayleigh number R^x is reached. For weak fields $R_1 < R_0$ instability occurs always at $R = R_1$ and its beginning is delayed by the increase of magnetic

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Stationary convective motion ... S/207/62/000/002/003/015
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field strength. For strong fields $R_1 > R_0$, and instability appears at $R = R_c$. In the latter case R_0 and the axially symmetric part of the process are not dependent on the magnetic field. The dependence of R_1 on M^2 for $M^2 \ll 1$ is found to be quadratic, and the asymptotic behavior of $R_1(M^2, \chi)$ together with the intermediate relation of the type $R^* \sim M^{3/2}$), is established. Finally the author discusses more complex critical regimes and their solutions, and adds a re-
mark concerning the paper of Yih Chia-shun, in which, in his opi-
nion, Joule heat in the axial flow and convective motion associa-
ted with it, were neglected without sufficient cause. There are 7 references: 5 Soviet-bloc and 2 non-Soviet-bloc. The references to the English-language publications read as follows: B. R. Morton, Laminar convection in uniformly heated vertical pipes, J. Fluid Mech., 1960, v. 8, no. 2, p. 227-240; Yih Chia-shun, Inhibition of hydrodynamic instability by an electric current, Phys. Fluids, 1959, v. 2, no. 2, p. 125-130.

SUBMITTED: December 2, 1961

Card 3/3

26125

10 2000 1327, 2207, 2808, 9901 S/040/61/025/004/004/021
D274/D306

AUTHOR: Regirer, S.A. (Moscow)

TITLE: Magneto-hydrodynamic flow along a conducting cylindrical surface

PERIODICAL: Prikladnaya matematika i mekhanika, v. 25, no. 4, 1961, 623-629

TEXT: An attempt is made at a more general approach to the problem of flow along conducting cylindrical surfaces; in earlier works, this problem was solved for a few particular cases only. A cylindrical surface S is considered with smooth and closed cross-section Σ. The equations are given for the velocity, magnetic field and pressure, as well as those for the electric field and current density, all relating to the flow past the cylindrical surface. Further, the equations are indicated for the the flow and electromagnetic field inside the surface. For the infinite conductivity of the body, it is in general not possible to obtain (by this method) as simple boundary conditions as were obtained without taking per-

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meability into account. If $H_\perp = \alpha V_\perp$ (the transverse flow takes place along the lines of force of the transverse magnetic field), the obtained equations reduce to

$$(\rho - \varkappa\alpha^2)(V_\perp\nabla) V_\perp - \varkappa\alpha V_\perp (V_\perp \nabla\alpha) - \eta\Delta V_\perp = -\nabla' p^* \tag{2.1}$$

$$V_\perp (V_\perp \nabla\alpha) = v_m [2(\nabla\alpha\nabla) V_\perp + \alpha\Delta V_\perp + V_\perp\Delta\alpha] \tag{2.2}$$

$$V_\perp (\rho\nabla v - \varkappa\alpha\nabla h) = -\frac{\partial p^*}{\partial z} + \varkappa h \frac{\partial h}{\partial z} + \eta\Delta v \tag{2.3}$$

$$V_\perp (\nabla h - \alpha\nabla v) = -v\frac{\partial h}{\partial z} + v_m\Delta h$$

$$\operatorname{div} V_\perp = 0, \qquad V_\perp\nabla\alpha = -\theta \tag{2.4}$$

where $\varkappa = \mu/4\pi$, $v_m = c^2/4\pi\mu\sigma$. These equations are considered in more detail for the simplest case α = const. It is noted that Eq. (2.2) and (2.4) are equivalent to the simpler ones

$$\operatorname{div} V_\perp = 0, \qquad \operatorname{rot} V_\perp = \Omega e_z \tag{3.1}$$

where Ω is an arbitrary constant. If the stream function is introduced in (3.1), the outer boundary-value problem is obtained:

$$\Delta\Psi = -\Omega; \quad \frac{\partial\Psi}{\partial\tau} = f(s), \quad \frac{\partial\Psi}{\partial n} = 0 \text{ on } \Sigma \tag{3.3}$$

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Magneto-hydrodynamic flow...

this problem reduces to finding the singularities of Ψ at infinity. An analogous inner boundary-value problem is formulated; thereby the determination of the vector potential A_ψ reduces to finding the singularities (sources) of the magnetic field inside the body. It is noted that in most cases which are relevant in practice, problems of type (3.3) have solutions for both inner and outer regions; moreover, the solutions satisfy (with $\Omega = 0$) such additional conditions as boundedness of $V_\perp$ and of $H_\perp$ at infinity. Integrating (2.1), and in view of (3.1), the total pressure is

$$p^* = p^*_\infty + (\varkappa\alpha^2 - \rho)(\Omega\psi + V_\perp{}^2/2), \quad p^*_\infty = \text{const} \qquad (3.5)$$

Dimensionless variables and parameters are introduced, and (2.3) is transformed to

$$R_i \frac{D(u_i, \psi)}{D(x,y)} = \Delta u_i \quad (i = 1,2) \qquad (3.8)$$

where $R = \frac{v_0 L}{\nu}$ (v_0 and L being characteristic velocity and length). Eq. (3.8) remains unchanged under any isotherm-coordinate transformations. By means of such transformations, it becomes possible to simplify (3.8), and to study flow past other cylindrical bodies.

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Magneto-hydrodynamic flow...

Some peculiarities are discussed of flow past dielectric bodies for the case of potential transverse flow. The streamlines ψ = const. go to infinity and lim $\varphi = \pm \infty$ for $\sqrt{x^2 + y^2} \to \infty$. Conditions are obtained for the flow for both sub- and super-Alfvén velocities. It is noted that only the solutions with S 1 constitute a direct generalization of the results of ordinary hydrodynamics. Finally, the resistance is calculated which a dielectric body experiences per unit of its length. There are 12 references: 5 Soviet-bloc and 7 non-Soviet-bloc. The 4 most recent references to English-language publications read as follows: P.S. Lykoudis, A discussion of magnetic boundary layers with boundary conditions assimilating combustion, blowing or sublimation at the wall. Proceed. 1-st Internat. Symp. Rarefied Gas Dynamics, 1960, 409-415; Yasuhara, M., Flow of a viscous electrically conducting fluid along a circular cylinder or a flat plate with uniform suction. J. Phys. Soc. Japan, 1960, v. 15, no. 2, 321-325; H.P. Greenspan, On the flow of a viscous electrically conducting fluid, Quart. Appl. Math., 1961, v. 18, no. 4, 408-411; R. Van. Blerkom, Magnetohydrodynamic flow of a viscous fluid past a sphere. J. Fluid Mech., 1960, v. 8, no. 3, 432-441.

SUBMITTED: April 24, 1961

Card 4/4

34362

S/207/62/000/001/003/018
B108/B104

10.2000
26.1410

AUTHOR: Regirer, S. A. (Moscow)

TITLE: Magnetohydrodynamic problems of steady convection in vertical channels

PERIODICAL: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no. 1, 1962, 15 - 19

TEXT: Problems of steady convection of a viscous conducting fluid in an infinitely long cylindrical channel inside a massive solid are dealt with from the viewpoint of magnetohydrodynamics. The general magnetohydrodynamic equations $\rho (\mathbf{V}\nabla)\mathbf{V} = -\nabla p^* + \eta\Delta\mathbf{V} + \varkappa(\mathbf{H}\nabla)\mathbf{H} - \rho\beta\mathbf{g}T$, $\operatorname{div}\mathbf{V} = 0$

$$(\mathbf{V}\nabla)\mathbf{H} = (\mathbf{H}\nabla)\mathbf{V} + \nu_m\Delta\mathbf{H}, \quad \operatorname{div}\mathbf{H} = 0, \; c_v\rho\mathbf{V}\nabla T = k\Delta T + \Phi \qquad (1.1)$$

$$\left(p^* = p - \rho g_z z + \frac{\mu H^2}{8\pi}, \; \varkappa = \frac{\mu}{4\pi}, \; \nu_m = \frac{c^2}{4\pi\mu\sigma}\right)$$

$$\operatorname{div}\mathbf{H}_e = 0, \quad \operatorname{rot}\mathbf{H}_e = \frac{4\pi}{c}\mathbf{j}_e, \quad \operatorname{rot}\mathbf{E}_e = 0 \qquad (1.2)$$

$$\mathbf{j}_e = \sigma_e\mathbf{E}_e, \; k_e\Delta T_e + \Phi_e = 0$$

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(Φ indicates the Joulean and viscous losses, Φ_e - power of the heat sources in the massive solid; subscript e indicates quantities relevant to the solid; channel axis along z) are solved on the conditions $\vec{V} = \vec{e}_z v(x,y)$, $\frac{\partial \vec{H}}{\partial z} = 0$, $\frac{\partial \Phi_e}{\partial z} = 0$. The massive solid is to be a dielectric which may contain linear conductors with currents producing a transverse magnetic field. The results are applied to the calculation of free convection in a cylindrical channel with zero vertical temperature gradient and $\Phi_e = 0$ with a current flowing along the fluid. The final result is

$$v = \frac{GP\Phi}{192}(3r^4 - 4r^2 + 1) - \frac{2G\chi\cos\theta}{M(1+\chi)} \frac{\mathrm{ber}_1 r\sqrt{M}\,\mathrm{bei}_1\sqrt{M} - \mathrm{bei}_1 r\sqrt{M}\,\mathrm{ber}_1\sqrt{M}}{\mathrm{ber}_1^2\sqrt{M} + \mathrm{bei}_1^2\sqrt{M}}$$

$$H_z = \frac{2P_m G\chi\sin\theta}{M^2(1+\chi)}\left(r - \frac{\mathrm{ber}_1 r\sqrt{M}\,\mathrm{ber}_1\sqrt{M} + \mathrm{bei}_1 r\sqrt{M}\,\mathrm{bei}_1\sqrt{M}}{\mathrm{ber}_1^2\sqrt{M} + \mathrm{bei}_1^2\sqrt{M}}\right) \tag{3.4}$$

$$t = \frac{P\Phi}{12}(1 - 3r^2) - \frac{2\chi}{1+\chi} r\cos\theta$$

$$t_e = -\frac{P\Phi}{6}\left(1 + \frac{3\ln r}{\chi}\right) - \left(r - \frac{1-\chi}{1+\chi}\frac{1}{r}\right)\cos\theta$$

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B108/B104

where $G = \frac{8gq_e r_o^4}{k\nu^2}$; $P = \frac{c_v \varrho \nu}{k}$; $P_m = \frac{\nu_m}{\nu}$; $M = \frac{\mu H_o r_o}{c}\sqrt{\frac{\sigma}{\varrho\nu}}$; $\chi = \frac{k_e}{k}$;

$H_o = 2\pi r_o j/c$; r_o is the channel radius. There are 8 references: 7 Soviet and 1 non-Soviet. The reference to the English-language publication reads as follows: Cramer K. R. J. Aero/Space Sci., 1961, v. 28, no. 9.

SUBMITTED: November 27, 1961

Card 3/3

L 15716-63 EPR/EPA(b)/EWT(l)/EPF(n)-2/EWG(k)/BDS/T-2/EEC(b)-2/ES(w)-2 AFFTC/ASD/ESD-3/AFWL/IJP(C)/SSD Ps-4/Pd-4/Pu-4/Pz-4/Pab-4/Pi-4/Po-4 WW/AT

ACCESSION NR: AR3002655 S/0124/63/000/005/B011/B012

98

SOURCE: Rzh. Mekhanika, Abs. 5B52

AUTHOR: Regirer, S.A.

TITLE: Flow of viscous conducting liquid in regions with permeable boundaries in the presence of a magnetic field

CITED SOURCE: Sb. Vopr. magnitn. gidrodinamiki i dinamiki plazmy. v. 2. Riga, AN LatvSSR, 1962, 107-112

TOPIC TAGS: flow, viscous liquid, conducting liquid, magnetic field, injection, suction, exhaustion, permeable, boundary

TRANSLATION: A short survey is made of the results of the study of the flow of viscous electroconductive liquid with constant physical properties in the presence of a simultaneous injection or exhaustion and of a magnetic field. The equations describing the motion of the liquid during the longitudinal flow -- along the x axis -- of an infinitely long cylindrical surface are written in the case when the external magnetic field along the z axis does not change. The

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ACCESSION NR: AR3002655

results of the solution of these equations for the case of flow around a plane infinite plate, under the conditions that the liquid fills all of the half space $y > 0$ and its speed in the z direction for $y \to \infty$ has a finite value. It is shown that this flow is achieved in the presence of two types of transverse fields: 1) H_y = const; and 2) $H_y = H_1 e^{v_0 y/\nu_m}$, where v_0 is the speed of injection. In the first case the general solution is written for the longitudinal component of the velocity and the magnetic field intensity $H_z(y)$. This solution contains four arbitrary constants c_i: 1) for the injection $(v_0 > 0)$ and for $\varepsilon^2 \leqslant 1$ only the trivial solution V_z = const and H_z = const exists; 2) for the suction $(v_0 < 0)$ and for $\varepsilon^2 \geqslant 0$ or for injection $(v_0 > 0)$ and for $\varepsilon^2 > 1$, one of the constants is zero and the three remaining are determined from the three boundary conditions; 3) for $v_0 < 0$ $\varepsilon^2 < 1$, all four constants can be found from the four boundary conditions. The most interesting is the following result: for a suction, in the case $\varepsilon^2 < 1$ in the contradiction to standard hydrodynamics, the viscous resistance of the plate and the total heat release are lowered; under some conditions the viscous resistance may even remain equal to zero. It is noted that all the results obtained for the plate remain valid for the case of longitudinal flow around a circular cylinder and for the problem of the flow between two cylindrical surfaces with parallel generatrices, when the liquid being injected through one

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ACCESSION NR: AR3002655

surface is fully exhausted through the other. The results of analogous problems are enumerated: the problem of the rotation of a cylinder which penetrates an infinite medium and others. V.M. Kuptsov

DATE ACQ: 14Jun63 SUB CODE: PH ENCL: 00

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L 15713-63 EWT(1)/EWG(k)/BDS/ES(w)-2 AFFTC/ASD/ESD-3/AFWL/IJP(C)/SSD

Pz-4/Pab-4/Pi-4/Po-4 AT S/0124/63/000/005/B007/B008

ACCESSION NR: AR3002652

77

SOURCE: Rzh. Mekhanika, Abs. 5B34

AUTHOR: Regirer, S.A.

TITLE: Flow of a viscous conducting liquid in tubes, in the presence of a magnetic field

21

CITED SOURCE: Sb. Vopr. magnitn. gidrodinamiki i dinamiki plazmy. v. 2. Riga, AN LatvSSR, 1962, 125-131

TOPIC TAGS: laminar flow, viscous liquid, conducting liquid, magnetic field, solenoidal field, irrotational field, potential field, convection, temperature gradient

TRANSLATION: The laminar flow of a viscous incompressible liquid with finite conductivity on the base portion of a cylindrical pipe with the generatric parallel to the z axis in the presence of a magnetic field is studied. The equation describing this flow is linear in the following cases: when free convection is not taken into account, if the vector of the transverse magnetic

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field H_λ is known; and when the convection is taken into account, if besides this vector, the temperature gradient in the direction of motion is known and if one may neglect the dissipation of energy by induced currents and the viscosity. It is shown that, in the case of isothermal flow, (without consideration of the free convection) the vector H_λ may easily be found in the case when H_λ does not vary in the direction of flow. It is shown that this occurs when the vector H_λ is either solenoidal with constant curl, or derived from a potential, with constant divergence. A series of calculations are made in which the solutions of the problems of flow in pipes for solenoidal and potential derived transverse fields are obtained. It is shown that, for nonisothermal flow, rectilinear motion in the vertical pipe is only possible when there is a constant vertical temperature gradient. V.M. Kuptsov

DATE ACQ: 14Jun63 SUB CODE: PH ENCL: 00

Card 2/2

S/179/62/000/006/002/022
E032/E114

AUTHOR: Regirer, S.A. (Moscow)

TITLE: The flow of an electrically conducting fluid in the entrance region of a flat duct

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye tekhnicheskikh nauk. Mekhanika i mashinostroyeniye, no.6, 1962, 6-9

TEXT: The flow of an incompressible, viscous, conducting fluid between two plane semi-infinite walls $y = \pm \delta$, $x \geqslant 0$ is considered in the presence of a two-dimensional magnetic field $B = e_x B_x(x,y) + e_y B_y(x,y)$. The problem is assumed to be plane so that $v = e_x v_x(x,y) + e_y v_y(x,y)$, $E = e_z E_o$ where E_o is a given electric field and $p = p(x,y)$. The equations of motion, which include simplified inertial and viscous terms, are taken to be of the form

$$\rho U_o \frac{\partial v_x}{\partial x} = - \frac{\partial p}{\partial x} + \eta \frac{\partial^2 v_x}{\partial y^2} - \frac{1}{c} j_z B_y \qquad (1.1)$$

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The flow of an electrically ... S/179/62/000/006/002/022
E032/E114

$$0 = \frac{\partial p}{\partial y} + \frac{1}{c} j_z B_x \tag{1.2}$$

$$\frac{\partial v_x}{\partial x} + \frac{\partial v_y}{\partial y} = 0 \tag{1.3}$$

where: U_o is the average longitudinal velocity, j_z is the z component of the current density and is given by:

$$j_z = \sigma \left[E_o + \frac{1}{c} (v_x B_y - v_y B_x)\right] \tag{1.4}$$

A solution of these equations is sought subject to the conditions:

$$p(0, y) = p_o(y), \qquad v_x(0, y) = U(y)$$

$$v(x, \pm \delta) = 0, \qquad \int_{-\delta}^{+\delta} v_x dy = 2\delta U_o \quad . \tag{1.5}$$

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The analysis is confined to the cases where: 1) the term in Eq.(1.4) which contains v_y which is small compared with v_x may be neglected, 2) when Eq.(1.4) is substituted into Eq.(1.1) the quantities $\partial p/\partial x$ and B_y may be replaced by their averages over the cross section, and the average transverse field $B_y = B(x)$ may be regarded as given and 3) the initial velocity profile is of the Poiseuille type, so that

$$U(y) = \frac{3}{2} U_o \left[1 - \left(\frac{y}{\delta}\right)^2\right]$$

and $B_y \to$ const when $x \to \infty$, $|B_y(x)| \leq B_o$.

Explicit expressions are obtained for the description of the flow subject to the above assumptions.

There is 1 figure.

SUBMITTED: August 13, 1962

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S/140/62/000/005/004/004
D237/D308

24 4700

AUTHOR: Regirer, S.A.

TITLE: Approximate theory of flow of a viscous incompressible fluid in pipes with porous walls

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Matematika, no. 5, 1962, 65 - 74

TEXT: A.S. Berman reduces Navier-Stokes equations to an ordinary differential equations, which is then solved by expansion of the unknown function into a series in powers of Reynold's number (Re). The author chooses a direct expansion of Navier-Stokes equations. The method makes it possible to obtain solutions for flows through channels of various geometrical forms and of flows with variable velocity of diffusion. Solutions are given to the zero and first approximations for the flows in cylindrical and rectangular pipes. Results of Berman and others are discussed in the light of the formulas obtained. It is noted that the iteration method is applicable for the problems considered above, that the present method presuppo-

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Approximate theory of flow ... S/140/62/000/005/004/004 D237/D308

ses that the velocity of diffusion V(z) has single-valued derivatives of the order equal to the degree of approximation and that the solution is always dependent on V(z). For small values of Re, the method is applicable to thermal flows and for the cases when velocity of diffusion V is the function of z and x. The debt to the late D.Ye. Dolidze is acknowledged and this article is a tribute to his memory.

ASSOCIATION: Severnoye otdeleniye instituta merzlotovedeniya im. V.A. Obrucheva (Northern Branch of the Institute of Permafrost Study im. V.A. Obruchev)

SUBMITTED: September 12, 1959

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REGIRER, S.A.

Approximate theory of the flow of an incompressible viscous fluid in pipes with porous walls. Izv. vys. uch.zav.; mat. no.5:65-74 '62. (MIRA 15:9)

1. Severnoye otdeleniye institut merzlotovedeniya imeni V. A. Obrucheva.

(Hydrodynamics)

REGIRER, S.A. (Moskva)

Magnetohydrodynamic problems concerning steady convection in vertical channels. PMTF no.1:15-19 Ja-F '62. (MIRA 15:4)
(Magnetohydrodynamics) (Heat--Convection)

REGIRER, S. A. (Moskva)

Steady convective motion of a viscous conducting fluid in a circular vertical channel. PMTF no.2:14-19 Mr-Ap '62.
(MIRA 16:1)

(Heat—Convection) (Magnetohydrodynamics)

REGIRER, S.A. (Moskva)

Flow of a conducting fluid in the entrance region of a flat pipe. Izv.AN SSSR.Otd.tekh.nauk.Mekh.i mashinostr. no.6:6-9 N-D '62.
(MIRA 15:12)

(Magnetohydrodynamics)

VATAZHIN, A.B. (Moskva); REGIRER, S.A. (Moskva)

Approximate computation of current distribution in the flow of a conducting fluid along a channel in a magnetic field. Prikl. mat. i mekh. 26 no.3:548-556 My-Je '62. (MIRA 16:5)
(Magnetohydrodynamics) (Electric currents)

38094

26.1410

S/040/62/026/003/017/020
D407/D301

AUTHORS: Vatazhin, A.B., and Regirer, S.A. (Moscow)

TITLE: Approximate calculation of current distribution in conducting-fluid flow in a channel in the presence of a magnetic field

PERIODICAL: Prikladnaya matematika i mekhanika, v. 26, no. 3, 1962, 548 - 556

TEXT: The problem of current distribution is considered in its general formulation. The conditions are stated which lead to simplified solution-schemes. First, the space-distribution of the current is considered. In various cases (e.g. the flow takes place under weak magnetohydrodynamic action, the electromagnetic forces are close to potential forces, etc.), the hydrodynamic quantities can be assumed as approximately known from the corresponding solutions of ordinary hydrodynamics (in the absence of a magnetic field); these quantities can be used for determining the current distribution. Assuming the hydrodynamic quantities as known, the stationary problem of current distribution is described by the system of equations

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Approximate calculation of current ... S/040/62/026/003/017/020
D407/D301

$$f(j,\ \sigma,\ \nabla\varphi,\ B,\ v,\ \ldots) = 0 \qquad (1.1)$$

$$\text{rot}\ B = \frac{4\pi\mu}{c}\ j, \qquad \text{div}\ B = 0 \qquad (1.2)$$

$$\text{div}\ j = 0 \qquad (1.3)$$

where φ is the electrostatic potential and B - the vector of magnetic induction. Eq. (1.1) represents Ohm's law. All the arguments of f, except B, j and $\nabla\varphi$, are known. In contradistinction to so-called "kinematic" problems, in which an exact solution to system (1.1)-(1.3) is sought, the author considers its approximate solution on the basis of additional assumptions concerning the properties of the fluid, the geometry of flow, and the character of the magnetic field The case is considered, in which the interval magnetic field has a non-constant z-component which depends on x and y. The distribution of the currents and of the magnetic field is determined from Eq. (1.2) and from Ohm's law (1.1), which is written, in many cases which are of practical interest, (the Hall effect being taken into account), as

$$j = \sigma(-\nabla\varphi + \frac{1}{c}\ v \times B) - \alpha j \cdot x\ B\ (\alpha = \frac{\omega\tau}{B}) \qquad (2.2)$$

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The solution of system (1.2) (2.2) is greatly simplified in the case of small magnetic Reynolds-numbers R_m, when the magnetic field in the fluid differs little from the external field. In setting up the boundary conditions, it is assumed that the channel has infinite length. Further, fluid flow in the presence of an external three-dimensional magnetic-field is considered (the external magnetic field in the previous case had only a non-zero z-component). Ohm's law is written in the form

$$j = \sigma(-\nabla\varphi + \frac{1}{c} v \times B). \qquad (3.1)$$

At small Reynolds number R_m, one obtains

$$\Delta\varphi = \nabla \ln \sigma(-\nabla\varphi + \frac{1}{c} v \times B) + \frac{B}{c} \operatorname{rot} v; \qquad (3.3)$$

v and σ are given; thereupon the potential φ can be found from (3.3) and the current j from (3.1). Further, two-dimensional problems are considered. Rectilinear fluid-flow with small R_m is assumed. Thereby equations (3.1) (3.3) are simplified. The transition from three-

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D407/D30

dimensional problems to two-dimensional ones can be effected by averaging over the width of the channel. The case of fluid-flow with anisotropic conductivity is also considered. It is noted that the above problems lead to Poisson's equation or to a non-homogeneous elliptic equation of a more general type; homogeneous equations are obtained only in a few cases. This is not convenient for practical problems. The most important English-language reference reads as follows: H. Grad, Reducible Problems in magneto-fluid dynamic steady flows. Rev. Mod. Phys., 1960, v. 32, no. 4, 830 - 847.

SUBMITTED: March 5, 1962

Card 4/4

ACCESSION NR: AT4042285 S/0000/63/003/000/0081/0088

AUTHOR: Regirer, S. A.

TITLE: Effect of a boundary layer on current distribution for flow of a conducting fluid in a channel

SOURCE: Soveshchaniye po teoreticheskoy i prokladnoy magnitnoy gidrodinamike. 3d, Riga, 1962. Voprosy* magnitnoy gidrodinamiki (Problems in magnetic hydrodynamics); doklady* soveshchaniya, v. 3. Riga, Izd-vo AN LatSSR, 1963, 81-88

TOPIC TAGS: conducting fluid flow, electric potential distribution, transverse potential distribution, longitudinal potential distribution, channel material, velocity profile, boundary layer, hydromagnetics

ABSTRACT: Two partial problems on the electric potential distribution in channels with either dielectric walls $y = \pm\delta$ (longitudinal; see Fig. 1 in the Enclosure) or two walls of ideal and two of partial conductors (transverse; see Fig. 2 in the Enclosure) are solved to clarify the effect of changes in velocity profiles on the obtained solutions and, particularly, the effects of a boundary layer on velocity profiles. The problems incorporate a variable dimensionless parameter N, characterizing the level of profile density, variations in which allow one to obtain velocity profiles ranging from parabolic ($N \to 0$) to uniform ($N \to \infty$). It

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was found that the effects of a boundary layer can be ignored for the longitudinal problem. For the transverse problem the velocity profile does not govern either electrode potential or total current, while the conductivity of the channel wall can act to reduce these parameters substantially. Joule losses increase with increases in depth of the boundary layer and conductivity of the vertical channel walls, the latter factor being the more significant. Orig. art. has: 2 figures and 16 numbered equations.

ASSOCIATION: none

SUBMITTED: 04Dec63 ENCL: 02

SUB CODE: ME NO REF SOV: 002 OTHER: 001

Card 2/4

ACCESSION NR: AT4042285

ENCLOSURE: 01

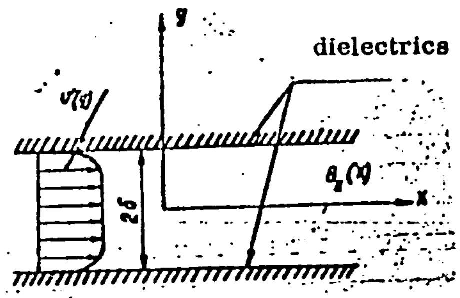

Figure 1.

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ENCLOSURE: 02

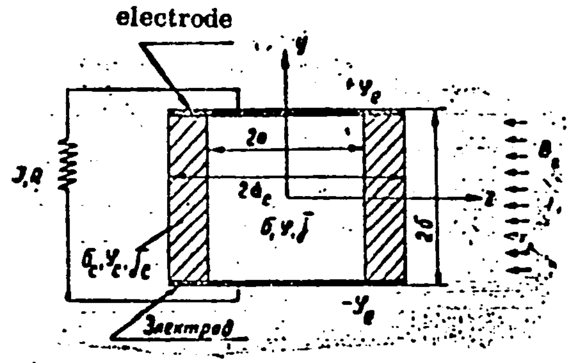

Figure 2.

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ACCESSION NR: AT4042286 S/0000/63/003/000/0089/0097

AUTHOR: Regirer, S. A.

TITLE: Self-similar turbulent motions of a viscous conductor fluid in a magnetic field

SOURCE: Soveshchaniye po teoreticheskoy i prikladnoy magnitnoy gidrodinamike. 3d, Riga, 1962. Voprosy* magnitnoy gidrodinamiki (Problems in magnetic hydrodynamics); doklady* soveshchaniya, v. 3. Riga, Izd-vo AN LatSSR, 1963, 89-97

TOPIC TAGS: hydromagnetics, viscous conductor fluid, turbulent flow, transverse magnetic field, hydromagnetic problem selfsimilarity

ABSTRACT: The author analyzes the possibility of deriving accurate solutions to hydromagnetic problems based on assumptions of their selfsimilarity. He finds that hydromagnetic equations (induction, potentials, density of space charge) for a viscous incompressible medium of constant conductivity are invariant to a group of similarity transformations

$$t \to \alpha t; \quad r \to \sqrt{\alpha} r; \quad v \to \frac{1}{\sqrt{\alpha}} v; \quad H \to \frac{1}{\sqrt{\alpha}} H; \quad p \to \frac{1}{\alpha} p;$$

ACCESSION NR: AT4042286

$$E \to \frac{1}{\alpha} E; \; j \to \frac{1}{\alpha} j; \; \rho_e \to \frac{1}{\alpha\sqrt{\alpha}} \rho_e; \quad \Phi \to \frac{1}{\sqrt{\alpha}} \Phi;$$

$$A \to A; \quad (r = \sum_i e_i x_i), \qquad (1)$$

assumes the existence of solutions to such equations which would also be invariant to that group, and presents a detailed analysis of the appropriate mathematical operations. Orig. art. has: 49 equations.

ASSOCIATION: none

SUBMITTED: 04Dec63

ENCL: 00

SUB CODE: ME

NO REF SOV: 004

OTHER: 002

Card 2/2

REGIRER, S.A. (Moskva)

Flow of a conducting fluid over a permeable plane in the presence of an inhomogenous magnetic field. Prikl. mat. i mekh. 27 no.6: 1095-1099 N-D '63. (MIRA 17:1)

REGIRER, S.A. (Moscow)

"Conductive fluid flows in channels with a longitudinal magnetic field"

Report presented at the 2nd All-Union Congress on Theoretical and Applied Mechanics, Moscow 29 Jan - 5 Feb 64.

REGIRER, S.A. (Moskva)

Electric field in a magnetohydrodynamic rectangular channel with nonconducting walls. PMTF no.3:60-68 My-Je '64. (MIRA 17:6)

ACCESSION NR: AP4041193 S/0207/64/000/003/0060/0068

AUTHOR: Regirer, S. A. (Moscow)

TITLE: Electric field in a magnetohydrodynamic channel of rectangular section with nonconductive walls

SOURCE: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no. 3, 1964, 60-68

TOPIC TAGS: electric field, magnetohydrodynamics, nonconductive wall, conductive fluid, electric potential, Joule dissipation, rectangular channel, transverse boundary effect, rectilinear flow, velocity vector, current density

ABSTRACT: Under the assumptions of constant and variable conductivity of the fluid, the author is concerned with the problem of finding the electric field in a channel with parallel, nonconductive walls. With Joule dissipation, if the velocity of the fluid changes in the direction of the magnetic field, the distribution of the electric potential and current cannot be obtained by averaging the corresponding distributions in the channel, as has been done for other cases. Considering these changes, the author wishes to estimate the effect of the "transverse boundary effect," i.e., of closed currents circulating in the plane of a

Card 1/2

ACCESSION NR: AP4041193

cross section of the channel. He discusses the conditions which must be satisfied in the general case for solution of the magnetic field, investigating the solution for the case of rectilinear flow in a homogeneous transverse field. He gives a complete solution for the three-dimensional problem of current distribution in a channel with nonconductive walls and rectangular section. This solution is valid for any given relation between the velocity vectors, the magnetic field, and the coordinates. Orig. art. has: 41 formulas and 3 figures.

ASSOCIATION: none

SUBMITTED: 12Mar64

ENCL: 00

SUB CODE: EM

NO REF SOV: 004

OTHER: 001

Card 2/2

L 57472-65 EWT(1)/EWP(m)/EWA(d)/FCS(k)/EWA(1) Pd-1

ACCESSION NR: AP5014170 UR/0382/65/000/001/0005/0017
538.4:532.542.2

29
B

AUTHOR: Regirer, S. A.

TITLE: Laminar flows of conducting fluids in pipes and channels in the presence of magnetic fields

SOURCE: Magnitnaya gidrodinamika, no. 1, 1965, 5-17

TOPIC TAGS: magnetohydrodynamics, plasma flow, Reynolds number

ABSTRACT: Theory of laminar magnetohydrodynamic flow of viscous conducting liquids and gases in pipes and channels in the presence of magnetic fields is reviewed. Both exact and approximate methods are covered. The following types of problems are reviewed: static flows of incompressible fluids, heat exchange in static flows, and non-stationary flows of incompressible liquids all with straight streamlines. In addition, flows at small magnetic Reynolds numbers, the influence of conductivity anisotropy and other theoretical results are covered. Only basic ideas, methods and results are discussed. Some of the problems needing further investigation are mentioned. 167 references to Soviet and Western literature are included.

Card 1/2

L 57472-65

ACCESSION NR: AP5014170

ASSOCIATION: none

SUBMITTED: 01Jul64 ENCL: 00 SUB CODE: ME, EM

NO REF SOV: 079 OTHER: 088

Card 2/2

L 34987-65 EWT(1)/EPA(s)-2/EWT(m)/EPF(n)-2/EPR/EWP(t)/EPA(bb)-2/EWP(b)/EWA(m)-2/
EWA(h) Ps-4/Pt-10/Peb/Pu-4 JD/WW/JG

S/0286/65/000/004/0072/0072

ACCESSION NR: AP5007449

44

B

AUTHOR: Regirer, S. A.

TITLE: Method for measuring the flow of a conducting liquid. Class 42, No. 168483

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 4, 1965, 72

TOPIC TAGS: liquid flowmeter

ABSTRACT: This Author Certificate presents a method for measuring the flow of a conducting liquid, which is based on the induction of an emf in the liquid with its motion in a magnetic field. To exclude the effect of magnetic field distortion on the results and to broaden the possibilities of the structural design of flowmeter magnetic systems, potentials are measured at several points along the forming surface of the pipeline. The potentials are added, and the sum, which is proportional to the flow, is recorded by a measuring device calibrated in flow units. The number of measuring points selected depends on the required accuracy and the degree of field distortion.

ASSOCIATION: none

SUBMITTED: 29Nov63 ENCL: 00 SUB CODE: ME

NO REF SOV: 000 OTHER: 000

Card 1/1

L 15654-66 EWT(1)/EWP(m)/EWT(m)/ETC(F)/EWG(m)/EWA(d)/T/ETC(m)-6/EWA(1) DS/WW

ACC NR: AP6003203 SOURCE CODE: UR/0382/65/000/004/0050/0052

AUTHOR: Parfenov, B. V.; Regirer, S. A.

ORG: none

TITLE: The flow of electrolyte in a circular tube in the presence of a magnetic field

SOURCE: Magnitnaya gidrodinamika, no. 4, 1965, 50-52

TOPIC TAGS: electrolyte, Reynolds number, transverse magnetic field, MHD flow

ABSTRACT: The electrolyte (a solution of 10% hydrochloric acid in water) was circulated through round tubes of varying diameter (from .35 to 3.0 cm). Both glass and plastic were used as tube material; the other parts of the experimental apparatus were also made of nonconducting materials. The flow parameters are given in terms of Hartmann and Reynolds numbers for tubes with smooth and rough internal surfaces. It was noted that even in absence of the magnetic field, parasite potentials developed across measuring electrodes, thus complicating the measurement procedures. All measurements of the induced potential differences arising from the

 UDC: 538.4

L 15654-66

ACC NR: AP6003203

presence of the magnetic field were conducted at laminar flow and transitions to the turbulent flows. No noticeable difference in the accuracy due to change from laminar to turbulent flow was observed. Results of experiments agree with the theoretical formula derived by R. R. Gold (J. Fluid Mech., 1962, 13, 4, 505) for an infinitely long tube. The authors thank G. R. Alanidze for his great service in conducting and analyzing the experiments. Orig. art. has: 3 figures.

SUB CODE: 20/ SUBM DATE: 16Mar65/ ORIG REF: 001/ OTH REF: 005

Card 2/2

L 17838-66 EWP(m)/EWT(l)/T-2 IJP(c)

ACC NR: AP6004072 SOURCE CODE: UR/0040/65/029/005/0870/0878

AUTHORS: Regirer, S. A. (Moscow); Rutkevich, I. M. (Moscow)

67
B

ORG: none

21,44,55 1,44,55

TITLE: Electric field in a magnetohydrodynamic channel where the medium moves with variable electric conductivity

SOURCE: Prikladnaya matematika i mekhanika, v. 29, no. 5, 1965, 870-878

TOPIC TAGS: MHD, electric field, electric conductivity, periodic function, magnetic field, electric potential

ABSTRACT: The electric field inside an MHD channel is calculated for the case of a periodically varying electric conductivity given by

$$\sigma = \sigma_0\psi(x - Ut) = \sigma_0\psi(x + \lambda - Ut).$$

For a small magnetic Reynolds number the governing equation for the electric potential is given by

$$\frac{\partial^2\varphi}{\partial x^2} + \frac{\partial^2\varphi}{\partial y^2} + \frac{\psi'}{\psi}\frac{\partial\varphi}{\partial x} = 0, \quad j_x = -\sigma\frac{\partial\varphi}{\partial x}, \quad j_y = -\sigma\left(\frac{\partial\varphi}{\partial y} + \frac{UB}{c}\right).$$

Card 1/3

2

L 17838-66
ACC NR: AP6004072

D

The boundary conditions are

$$\frac{\partial \varphi}{\partial y} = -\frac{UB}{c} \quad \text{at } y = \pm\delta, \quad \nabla\varphi \to 0 \quad \text{at } |x| \to \infty .$$

To solve the above equation for the electric potential, the following auxiliary potential is introduced $\Phi = \varphi + UBy/c$, which allows for the series solution

$$\Phi = \sum_{k=1}^{\infty} \Phi_k(x, t) \sin \alpha_k y, \qquad \alpha_k = \pi(k - 1/2) .$$

This solution is discussed in detail for the case where the conductivity of the media is given by $\psi = \cos^2 \beta\xi$. The general solution in this case is shown to be discontinuous and expressed by

$$\Phi_k = \frac{1}{\cos\beta\xi}[(C_{nk} - G_{nk})e^{\gamma_k \beta\xi} + (D_{nk} + H_{nk})e^{-\gamma_k\beta\xi}], \qquad x \in [x_{n-1}, x_n]$$

where

$$C_{nk} = -(2\,\mathrm{sh}\,\pi\gamma_k)^{-1}[G_{nk}(x_{n-1})\,e^{-\gamma_k\pi} + H_{nk}(x_n)\,e^{-2\gamma_k\pi n}]$$

$$D_{nk} = (2\,\mathrm{sh}\,\pi\gamma_k)^{-1}[G_{nk}(x_{n-1})\,e^{2\gamma_k\pi n} + H_{nk}(x_n)\,e^{-\gamma_k\pi}].$$

This in turn is shown to satisfy the condition at infinity in the form

$$\lim_{|n|\to\infty} \Phi_k\{x \in [x_{n-1}, x_n]\} = 0 .$$

Physically, the effect of a discontinuous tangential component in the electric

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L 17838-66
ACC NR: AP6004072

field can be due to the existence of an infinitely thin layer with nonzero electric resistivity. A special case is considered where the magnetic field is a step function given by

$$f(x) = \eta(x) = \begin{cases} 0 & \text{at } x < 0, \quad f'(x) = \delta(x) \\ 1 & \text{at } x > 0, \quad f''(x) = \delta'(x), \end{cases}$$

The resulting electric field potential for $|t| < 1/2$ is given by

$$\Phi_k = \begin{cases} 0 & \text{at } x > x_0 \text{ and } x < x_{-1} \\ K^-[\gamma_k \cos \pi t \operatorname{ch} \gamma_k (\pi t + {}^1/_2\pi) + \sin \pi t \operatorname{sh} \gamma_k (\pi t + {}^1/_2\pi)] & \text{at } x_{-1} < x < 0 \\ K^+[\gamma_k \cos \pi t \operatorname{ch} \gamma_k (\pi t - {}^1/_2\pi) + \sin \pi t \operatorname{sh} \gamma_k (\pi t - {}^1/_2\pi)] & \text{at } 0 < x < x_0 \end{cases}$$

$$K^{\pm} = \frac{\omega_k}{\gamma_k \operatorname{sh} \pi\gamma_k \cos \beta\xi} \operatorname{sh} \gamma_k \left(\pi t \pm \frac{\pi}{2} - \beta x\right)$$

from which the joule dissipation can be calculated. Orig. art. has: 33 equations and 3 figures.

SUB CODE: 20/ SUBM DATE: 27May65/ ORIG REF: 005/ OTH REF: 001

Card 3/3 nst

L 23442-66 EWT(1)/EWP(m)/EWA(d)/ETC(m)-6/EWA(1) WW

ACC NR: AP6007584 SOURCE CODE: UR/0040/66/030/001/0154/0163

AUTHORS: Regirer, S. A. (Moscow); Chekmarev, I. B. (Leningrad)

ORG: none

60
B

TITLE: Steady state flows of an anisotropically conducting medium in a half-space

SOURCE: Prikladnaya matematika i mekhanika, v. 30, no. 1, 1966, 154-163

TOPIC TAGS: MHD, compressible flow, steady flow, conductive fluid, plasma

1,55

ABSTRACT: The steady flow of a conducting fluid over an infinite plane under the action of a uniform magnetic field B_0 is investigated. An assumption is made that the temperature dependence of the physical properties of the fluid is known. As a first approximation, these properties are assumed constant, and a finite solution is obtained in the form

$$V^\circ = V_\infty^\circ + C_1 e^{\gamma_1 y_1} + C_2 e^{\gamma_2 y_1}$$

$$\gamma_{1,2} = s_{1,2} + i\omega_{1,2} = {}^1/_2 (R + R_m^\circ) \pm {}^1/_2 \sqrt{(R + R_m^\circ)^2 - 4 (RR_m^\circ - M^{\circ 2})},$$

where it is shown that the solutions $V^0(y)$, $B^0(y)$, $J^0(y)$ in general have a nonmonotonic characteristic. Next, the wavelength $\lambda = 2\pi/\omega$ is juxtaposed on the

Card 1/2

L 23442-66
ACC NR: AP6007584

velocity profile for $\lambda \ll \delta$. To evaluate the effect of variable properties and compressibility on the flow field, an approximate solution is attempted by means of small perturbations on the various flow parameters. To study the effect of nonmonotonic velocity distribution, the case of a rotating flat plate in an incompressible fluid is analyzed with the magnetic field aligned parallel to the axis of rotation. Orig. art. has: 50 equations and 1 table.

SUB CODE: 20/ SUBM DATE: 09Aug65/ ORIG REF: 007/ OTH REF: 002

Card 2/2

L 24323-66 EWT(m)/T

ACC NR: AP6007227 SOURCE CODE: UR/0056/66/050/002/0457/0458

AUTHOR: Rekalo, M. P.

ORG: Physicotechnical Institute, Academy of Sciences, Ukrainian SSR (Fiziko-tekhnicheskiy institut Akademii nauk Ukrainskoy SSR)

TITLE: Possible value of the quadrupole moment of the Ω^- baryon

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 50, no. 2, 1966, 457-458

TOPIC TAGS: baryon, nuclear isobar, quadrupole moment

ABSTRACT: The author estimates the electric quadrupole moment which would be possessed by baryons of the decuplet within the framework of SU(6) symmetry in the case when the radiative decay of the nucleon isobar $N^{*+} \to p + \gamma$ contains a small admixture (of the order of 5%) of γ quanta. This admixture is predicted by the isobar model. The estimate is based on the assumption that the operator of the quadrupole moment of the baryons transforms with respect to unitary SU(3) group like the corresponding component of an octet. In the simplest hypothesis, this operator belongs to a 405-plet, and an expression is obtained for the amplitudes of the quadrupole radiative transition of the decuplet into an octet on this basis. Orig. art. has: 6 formulas.

SUB CODE: 20/ SUBM DATE: 04Aug65/ OTH REF: 001

Card 1/1

L 5390-66 EWP(m)/EPA(w)-2/EWT(1)/T-2/EPA(sp)-2/EWA(m)-2 IJP(c)

ACC NR: AP5027268 SOURCE CODE: UR/0207/65/000/005/0034/0039

AUTHORS: Kulikovskiy, A. G. (Moscow); Regirer, S. A. (Moscow)
44,55 44,55

71
B

ORG: none

TITLE: On the effect of walls on overheat instability in a magnetohydrodynamic channel 1,44,55

SOURCE: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no. 5, 1965, 34-39

TOPIC TAGS: magnetohydrodynamic heating, MHD instability, temperature distribution, electric field, stability criterion, plasma flow, electric conductivity

ABSTRACT: The stability of the temperature field in a plane electric discharge channel is studied analytically, using simplifying assumptions. The plasma flow is assumed to be incompressible, moving at a constant velocity U, and bounded by two electrodes $y = \pm L$ at constant temperature and electric potential. The undisturbed temperature field is represented by the equation

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0701 /2 40

L 5390-66

ACC NR: AP5027268

$$\frac{d^2T_0}{dy^2} = -\frac{\alpha^2}{\sigma}, \quad T_0(\pm 1) = T_w, \quad \alpha^2 = \alpha_0^2\left(\int_{-1}^{1} \frac{dy}{\sigma}\right)^{-2}$$

and the linearised equations for the perturbed temperature by

$$\frac{\partial T}{\partial t} = \triangle T + 2\frac{\partial f}{\partial y} + \alpha^2 \frac{T}{\sigma^2}\frac{d\sigma}{dT}, \qquad T(\pm 1) = 0$$

$$\frac{\partial}{\partial x}\left(\sigma\frac{\partial f}{\partial x}\right) + \frac{\partial}{\partial y}\left(\sigma\frac{\partial f}{\partial y} + \alpha^2\frac{T}{\sigma}\frac{d\sigma}{dt}\right) = 0, \qquad f(\pm 1) = 0$$

where

$$t' = \frac{t}{\rho c_v L^2}, \quad y' = \frac{y}{L}, \quad x' = \frac{x}{L}, \quad f = \varphi\frac{jL}{\varkappa T^*}, \quad T' = \frac{T}{T^*},$$

$$T_0' = \frac{T_0}{T^*}, \quad \alpha^2 = \frac{j^2L^2}{\varkappa T^*\sigma^*}, \quad \sigma' = \frac{\sigma}{\sigma^*}; \quad \alpha_0^2 = \frac{4\varphi_e^2\sigma^*}{\varkappa T^*}.$$

In the above equations it is assumed that the conductivity depends on the unperturbed temperature T_0 only. The particular solution for these equations is postulated by the temperature and electric potential functions

$$T = \theta(y)e^{ikx-\lambda t}, \qquad f = \psi(y)e^{ikx-\lambda t}.$$

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ACC NR: AP5027268

For large values of the wavelength λ a self-adjoint equation is obtained for the perturbed temperature field under the condition that the electric conductivity must be represented by

$$\sigma(T) = Ae^{\beta T} \qquad (A, \beta = \text{const})$$

or

$$\sigma(T) = \frac{\alpha^2}{\beta^2}\frac{1}{B-T} \qquad (B, \beta = \text{const}).$$

The first of these leads to the following stability criteria. The transition to an unstable condition is connected with a bifurcation in the solution of the unperturbed temperature field equation. This point of bifurcation corresponds to the point of maximum of the function $\alpha_0(T_m)$ which exists for $\beta > 0$ but is absent when $\beta \leqslant 0$. The second conductivity law leads to the following transcendental equation

$$\frac{\operatorname{tg} a}{a} = \frac{3\beta^2 + a^2}{2\beta^2}\operatorname{th}\beta$$

whose roots indicate that the temperature field remains stable to large wavelength oscillations. This is also true for short wavelength perturbations if $k \geqslant 0$. Orig. art. has: 30 equations.

SUB CODE: EM, ME SUBM DATE: 25Jun65/ ORIG REF: 003/ OTH REF: 004

Card 3/3 RS

REGIRER, YE. I.

APOLLONOVA, L.P., red.; VAYMBOYM, V.S., red.; VASILEVSKIY, D.P., red.; VROBLEVSKIY, A.A., red.; GRIBKOVA, S.A., red.; GRIGORASH, G.L., red.; KAZNACHEY, B.Ya., red.; PARKHOMENKO, V.I., red.; PUSSET, L.A., red.; REGIRER, Ye.I., red.; ROZENBLAT, M.A., red.; MALKIEL', B.Z., red.

[Methods for testing magnetic tape recorders] Metodika ispytaniia magnitofonov. Moskva. 1958. 78 p. (Akademiia nauk SSSR. Morskoi gidrofizicheskii institut. Trudy, vol. 14). (MIRA 12:7)
(Magnetic recorders and recording--Testing)

REGIRER, YE. I.

The Calibration of Small Impact-Testing Machines. E. I. Regirer. (*Zavodskaya Laboratoriya*, 1955, 21, (1), 125-126). [In Russian]. Methods of correcting the readings of small impact testing machines are critically considered.—s. K.

KAZNACHEY, B.Ya.; REGIRER, Ye.I., redaktor; YUZHNAYA, Ye.A., redaktor; MEL'NIKOVA, N.V., tekhnicheskiy redaktor

[Galvanoplastic process in industry] Gal'vanoplastika v promyshlennosti. Pod red. E.I.Regirera. Moskva, Gos.izd-vo mestnoi promyshl. RSFSR, 1955. 173 p. (MLRA 8:12)
(Electrotyping)

REGIRER, E. I.

USSR/Engineering - Measuring instruments

Card 1/1 : Pub. 103 - 5/23

Authors : Regirer, E. I.

Title : An instrument for measuring wheel play

Periodical : Stan. i instr. 25, 8, 15-17, Aug 1954

Abstract : A description is presented of an instrument designed for measuring wheel play. Illustration and drawings depicting the structure of the above mentioned instrument are presented, together with data indicating its specification, operation, and dimensions.

Institution : ....

Submitted : ....

REGIRER YE.I.

USSR/ Chemistry of High-Molecular Substances F.

Abs Jour : Referat Zhur - Khimiya, No 4, 1957, 11929

Author : Regirer Ye.I., Kalantarova M.S.
Title : On Procedures of Recording and Interpretation of Thermomechanical Curves

Orig Pub : Kolloid. zh., 1955, 17, No 6, 439-451

Abstract : Recording of thermomechanical curves (TMC) of polymers having two limit points was effected according to previously described procedures (Kargin V.A., Sogolova T.I., Zh. fiz. khimii, 1949, 23, 530). For recording TMC use can be made of any instruments suitable for measuring the deformations of a specimen within a wide range of temperature. Pointed out is the correlation between TMC and other deformation characteristics of a polymer. TMC can be considered as a section, along the time axis, of the "surface of mechanical properties of the polymers" plotted for the given load as a tridimensional diagram: deformation, time and temperature. It is noted that in the case of some polymers the limit points are shifted following heating.

Card 1/2

R.G.RER, YE.I.

REGIRER, Ye.I.; KALANTAROVA, M.S.

One more on the thermomechanical curves. Koll. zhur. 19 no.6:752-755 N-D '57. (MIRA 11:1)

(Thermochemistry)

ARNOL'D, R.R.; APOLLONOVA, L.P., red.; [illegible], V.S., red.; VASILEVSKIY, D.P., red.; VROBLEVSKIY, A.A., red.; GRIBKOVA, G.L., red.; GRIGORASH, G.L., red.; KAZ[illegible], B.Ye., red.; PARKHOMENKO, V.I., red.; PUSSET, L.A., red.; R[illegible], Ye.I., red.; ROZENBLAT, M.A., red.; MALKIYEL', B.A., red.

[Magnetic heads for sound recording apparatus] Magnitnye golovki dlia apparatury zvukozapisi. Moskva, 1958. 153 p. (Moskva. Vsesoiuznyi nauchno-issledovatel'skii institut zvukozapisi. Trudy, no.3).
(MIRA 12:4)

(Magnetic recorders and recording--Equipment and supplies)

9(6) SOV/115-59-3-7/29

AUTHOR: Regirer, Ye.I.

TITLE: A Small-Size, Portable Piezo-Electric Profilograph (Malogabaritnyy perenosnyy p'yezoelektricheskiy profilograf)

PERIODICAL: Izmeritel'naya tekhnika, 1959, Nr 3, pp 11-14 (USSR)

ABSTRACT: A small-size, portable piezo-electric profilograph was developed by the Institut zvukozapisi (Institute of Sound Recording) in connection with an investigation of processes occurring during sound reproduction. I.F. Kadushin, P.G. Zon, M.I. Strelkov, N.N. Lukhmanova and V.I. Ul'yanov participated in the development of this device. The calibration of the device was performed with equipment certified by the Komitet standartov, mer i izmeritel'nykh priborov (Committee of Standards, Measures and Measuring Instruments). The device was designed by taking into consideration the works of LIAP and the improvements made by the manufacturer Brash on its profilograph. Subject profilograph is not identical with instruments of

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SOV/115-59-3-7/29

A Small-Size, Portable Piezo-Electric Profilograph

this kind presently manufactured and is characterized by a number of particularities. It consists of a transducer, a drive mechanism, an amplifier and a recording instrument as shown by figure 1. All parts together have a weight of 24.5 kg. The device was primarily designed for investigating surfaces used for sound recording and for studying the influence of local material defects on the sound reproduction. The device may be used also for other purposes where an investigation of a surface is required. The author describes in detail the components of this device and mentions briefly the operation technique. The transducer consists of a bimorph Rochelle salt crystal, 0.7x30x10 mm. The suspension of the transducer does not have any hinges and functions as an elastic system. It has one spherical support surface to which a load of about 25 g is applied. The drive mechanism contains the SD-2 electric synchronous motor which moves the transducer

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A Small-Size, Portable Piezo-Electric Profilograph

across the surface to be checked. Figure 3 shows the transducer drive mechanism. The amplifier, its circuit diagram is shown by figure 4, has four stages. The first three stages are resistor-coupled, while the fourth stage is assembled according to the cathode system. Negative feedback with a correcting circuit is used. The amplifier contains the following tubes: 1 6F5, 2 6G2, 1 6P6S, 1 6N8S, 1 6Ts5S, the voltage stabilizer SG-4S and the neon lamp MN-7. The amplification factor amounts up to 2,000. A microammeter MS-5 is used as an indicating instrument. Figure 5 shows the circuit diagram of the recorder and a photograph of the recording mechanism. The paper tape is fed at three speeds: 5, 25 and 125 mm/sec. The sensitivity of the recorder is 1.3 mm/v, that of the transducer is 20 mv/micron. There are 3 photographs, 1 drawing, and 2 circuit diagrams.

Card 3/3

REGIRER, Ye.I.

Development of the scientific justification of formulas for plastic materials of phonorecords. Trudy VNAIZ no.5:116-135 '59. (MIRA 15:4)

(Phonorecords) (Plastics)